

# St. Nicholas Adult High School



OTTAWA  
CATHOLIC  
SCHOOL BOARD

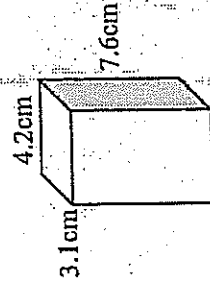
## MF2M2P - Practice Exam

SOLUTIONS

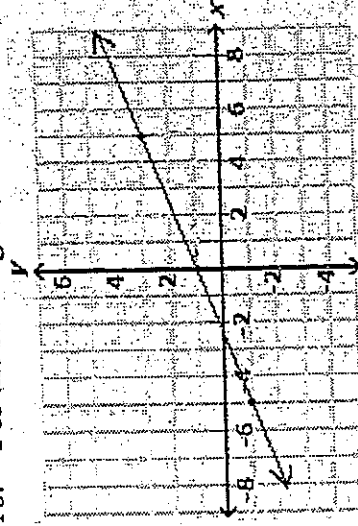
### PART A: SHORT ANSWER (20 marks)

Write your final answers in the space provided. (1 mark each)

- Solve the proportion for the unknown value  $4:18 = x:9$   $\frac{4}{18} = \frac{x}{9}$   
 $x=2$
- In  $\triangle ABC$  and  $\triangle PQR$  their corresponding angle's are *equal* and their side lengths are proportional so the triangles are similar  
0.7431  
 $61^\circ$   
 $m = -8$   
 $m = \frac{5}{4}$   
 $-7$   
yes  
 $10x^2 - 5x$   
 $5x^2$   
w/o  
9.36 lbs  
98.952 cm<sup>3</sup>
- Determine  $\cos 42^\circ$ . (round to 4 decimal places)
- If  $\tan A = 1.771$ , then  $\angle A =$  \_\_\_\_\_ (round to nearest degree)
- Solve for  $m$ .  $m - 4 = -12$
- What is the slope of the line defined by  $y = \frac{5}{4}x + 4$ ?
- What is the  $y$ -intercept of the line with equation  $y = -2x - 7$ ?
- Does the point  $A(2,5)$  satisfy the equation  $y = 4x - 3$ ?
- Simplify  $3x^2 - x + 7x^2 - 4x$
- State the greatest common factor contained in the expression  $5x^2 - 20x^3$
- State the direction of opening for the relation  $y = 2x^2$ .
- Convert 4.25 kg to pounds. (round to 2 decimal places)
- Determine the volume of the rectangular prism.



- The  $y$ -intercept for  $y = -x^2 + 5x - 4$  is:  $-4$
- Convert 500 cm to feet. 16.4 ft  
 $m = \frac{2}{5}$
- For the line segment shown below, state the slope.



- Solve the  $x$ -intercept for the line defined by  $3x + 4y + 6 = 0$ .  $x = -2$
- The zeros for  $y = -(x + 2)(x - 4)$  are:  $x = -2, 4$   
 $m = 3/4$   
down
- State the slope for the line  $3x - 4y + 8 = 0$
- State the direction of opening for the following parabola  $y = -3x^2 + 5x - 2$ .

**PART B: FULL SOLUTIONS (55 marks)**

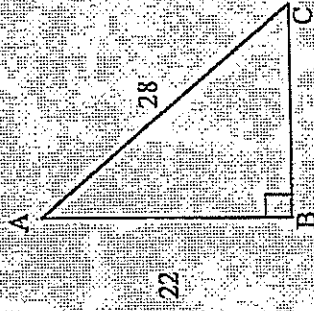
Provide full solutions in the spaces provided.

1. Determine the length of side BC.  
Round your answer to one decimal place.

$$28^2 = 22^2 + a^2$$

$$300 = a^2$$

$$17.32 = a$$

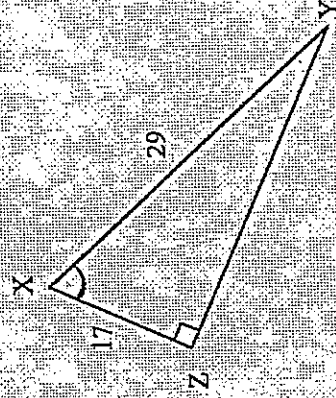


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2. Calculate the measure of angle X using the appropriate trigonometric function. Round to the nearest degree.

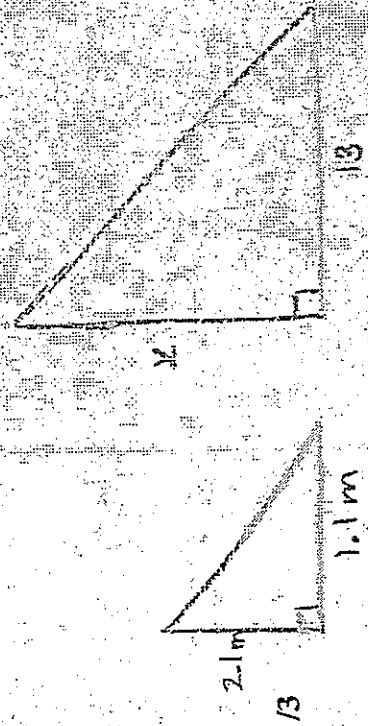
$$\cos X = \frac{17}{29}$$

$$X \approx 54^\circ$$



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3. A street sign, measuring 2.1 meters in height, casts a shadow exactly 1.1 meters long. At the same time, a building casts a shadow 13 meters long. Draw a labelled diagram to illustrate this situation and use similar triangles to determine the height of the tree to the nearest tenth of a meter.



$$\frac{2.1}{x} = \frac{1.1}{13}$$

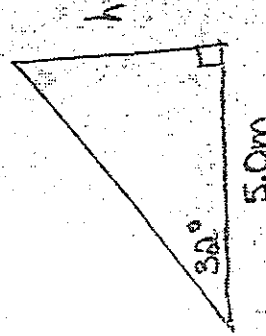
$$1.1x = 13(2.1)$$

$$1.1x = 27.3$$

$$x = 24.8m$$

$\therefore$  the tree is 24.8m tall.

4. Stacy is looking up at a  $32^\circ$  angle at her friend who is sitting in a tree house. She is standing 5.0m away from the base of a tree. Determine the height of the tree house. Draw a labeled diagram to illustrate this situation.



$$\tan 32^\circ = \frac{h}{5}$$

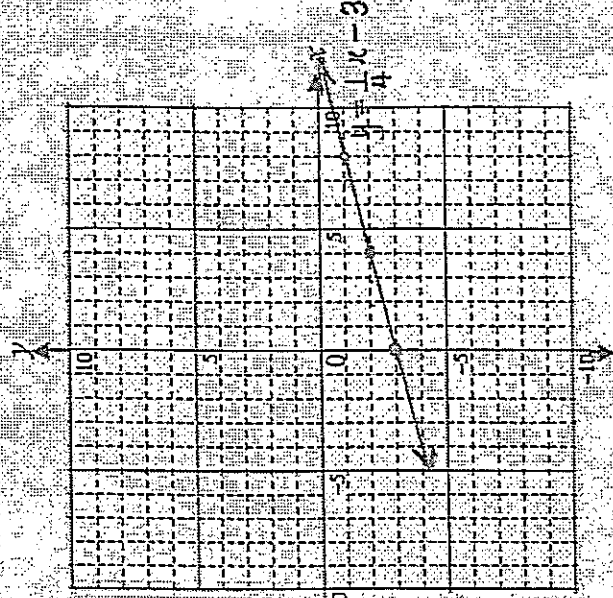
$$5(\tan 32^\circ) = h$$

$$3.1 = h$$

$\therefore$  the treehouse is 3.1m above the ground.

/4

5. Graph the line  $y = \frac{1}{4}x - 3$  on the grid provided.



$m = \frac{1}{4}$  ← up 1  
4 ← right 4

$y\text{-int} = -3$

starting point  
on  $y$ -axis

12

6. Solve each of the following equations.

a)  $2y + 3 - 6y = 12 - y$

$2y - 6y + y = 12 - 3$

$-3y = 9$

$y = \frac{9}{-3}$

$y = -3$

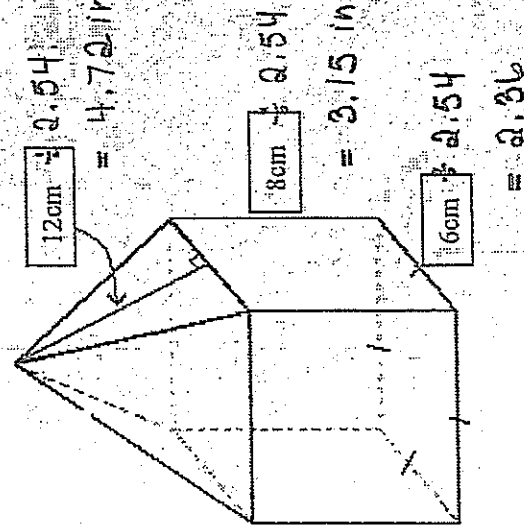
13

b)  $-3(m-1) + 2(m-4) = -(2m-6) + 6$   
 $-3m + 3 + 2m - 8 = -2m + 6 + 6$   
 $-3m + 2m + 2m = 6 + 6 - 3 + 8$   
 $m = 17$

14

7. Determine the surface area of the figure below in square inches. Show all your calculations for full marks.

$2.54 \text{ cm} = 1 \text{ inch}$



$12 \text{ cm} \div 2.54 = 4.72 \text{ in}$

$8 \text{ cm} \div 2.54 = 3.15 \text{ in}$

$16 \text{ cm} \div 2.54 = 6.3 \text{ in}$

$10 \text{ cm} \div 2.54 = 3.94 \text{ in}$

16

9. Determine the point of intersection of the two following lines, using ELIMINATION.

①  $3x + y = 4 \rightarrow 3 \times \textcircled{1} \quad 9x + 3y = 12$

②  $2x - 3y = 10 \quad \textcircled{2} \quad 2x - 3y = 10$

$11y = 22$

$y = 2$

Sub  $x = 2$  into ①  $3(2) + y = 4$   
 $6 + y = 4$   
 $y = -2$

Point of Intersection  $(2, -2)$

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10. Determine the point of intersection of the following two lines using SUBSTITUTION

①  $2x + y = 6$   
 ②  $3x - 2y = 2$

Isolate  $y$  in ①

$y = -2x + 6$

Sub into ② for  $y$

$3x - 2(-2x + 6) = 2$

Point of Int.  
 $(2, 2)$

Sub  $x = 2$  into  $y$

$2(2) + y = 6$

$4 + y = 6$

$y = 2$

11. Expand each of the following then simplify.

a)  $(2m + 5)(m - 5)$

$= 2m^2 - 10m + 5m - 25$

$= 2m^2 - 5m - 25$

c)  $2(x - 4)^2 + 3(x^2 + 3x - 8)$

$= 2(x^2 - 4)(x - 4) + 3(x^2 + 3x - 8)$

$= 2(x^2 - 4x - 4x + 16) + 3x^2 + 9x - 24$

$= 2(x^2 - 8x + 16) + 3x^2 + 9x - 24$

$= 2x^2 - 16x + 32 + 3x^2 + 9x - 24$

$= 5x^2 - 7x + 8$

12. Factor each of the following completely.

a)  $3x^2 - 9x$

$= 3x(x - 3)$

b)  $x^2 - 9$

$= (x + 3)(x - 3)$

c)  $x^2 - x - 6$

$= (x + 2)(x - 3)$

13. The following equation represents a parabola:

Factored Form:  $y = (x - 4)(x - 1)$

Using this equation, find the following values for the parabola.

a) Vertex:  $(2.5, -2.25)$

c) Axis of Symmetry:  $x = 2.5$

b) Direction of Opening: up

d) x-intercept(s): 4, 1

14. Maria and Frank are planning a wedding.

**Option 1:** Bernie's Banquet hall charges \$30 for each person and there is no cost to rent the hall.

**Option 2:** The Wedding Palace charges \$1500 to rent the hall and \$15 per person attending.

a) Determine an equation for each option where  $C$  represents the total cost and  $n$  is the number of people attending.

**Option 1:**  $C = 30n$

**Option 2:**  $C = 1500 + 15n$

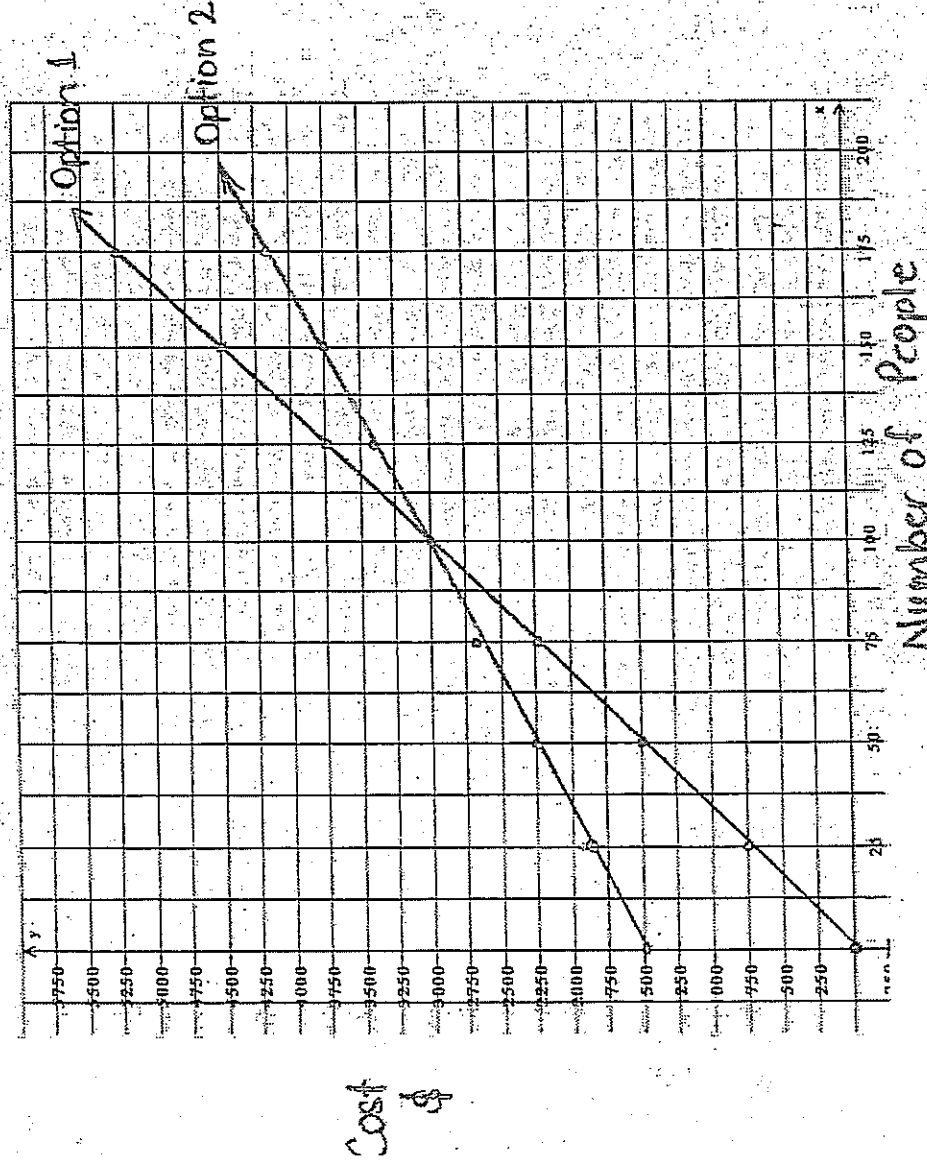
$x \text{ coord} = \frac{4+1}{2}$   
 $\text{vertex} = 2.5$   
 $y = (2.5-4)(2.5-1)$   
 $= (-1.5)(1.5)$   
 $= -2.25$

b) Fill in the following report table comparing their two options.

Number people	Cost (Option 1)	Cost (Option 2)
0	0	1500
25	750	1875
50	1500	2250
75	2250	2625
100	3000	3000
125	3750	3375
150	4500	3750
175	5250	4125

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c) Graph both options on the grid provided.



Cost \$

14

d) State the point of intersection, and explain what it represents in this problem.  
 (100, 3000) -> point where it costs the same no matter which option you choose

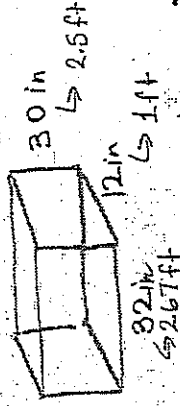
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15. Determine each of the following for the given parabola.

- a) The zeros  $x = -6$  or  $x = 2$   
 b) The coordinates of the vertex  $(-2, 8)$   
 c) The optimal value  $y = 8$

16. An rectangular box has a base that measures 32 inches by 12 inches at height of 30 inches

a) Draw sketch the box and label it with the provided dimensions.



b) Determine the volume of the box in litres.

$$V = 32(12)(30)$$

$$= 11520 \text{ in}^3 \rightarrow \text{convert to ft}^3$$

$$= 6.675 \text{ ft}^3$$

$$V_{28.32L} = 1113 \rightarrow 28.32L = 11$$

$$\rightarrow 189.036L^6$$

17. A ball is dropped from a platform. Its path can be represented by the relation  $h = -5t^2 + 45$ , where  $h$  represents the height of the ball in metres and  $t$  represents the time in seconds taken for the ball to fall to ground.

a) From what height was the ball dropped?  $t = 0$

$$h = -5(0)^2 + 45$$

$$= 45$$

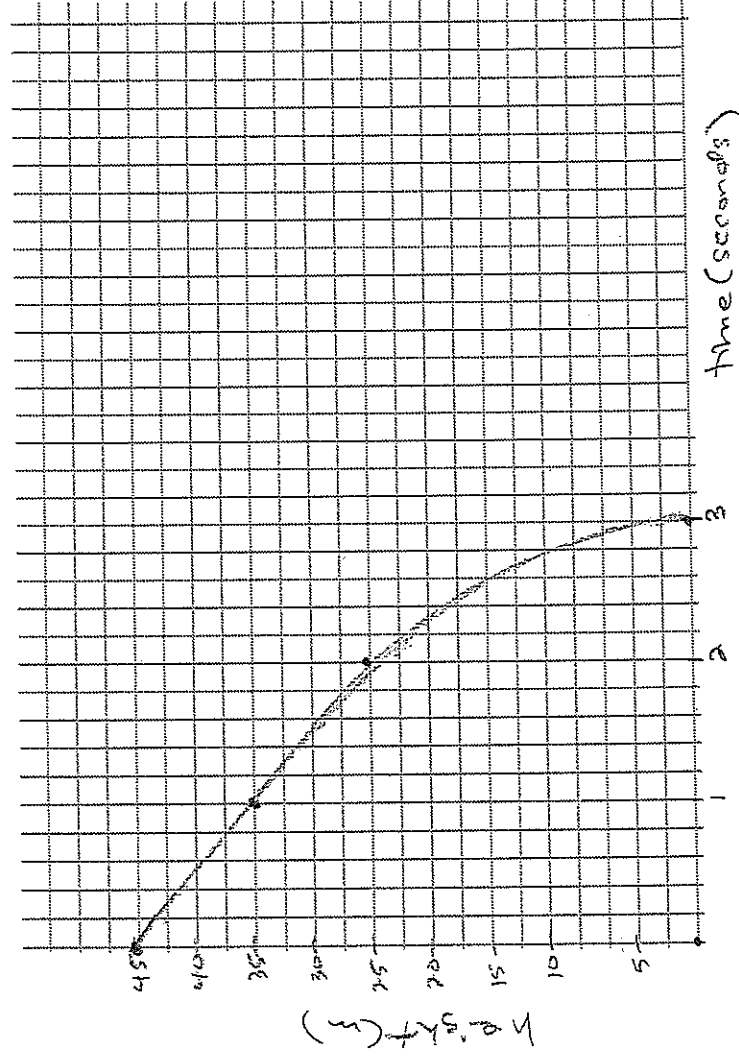
$\therefore$  The ball was dropped at 45 m

b) Complete the table of values for the relation.

$t$	$h$
0	45
1	<del>40</del> 40
2	25
3	0

c) Graph the relation below.

Ball Project



d) How long did it take the ball to reach the ground?

it took 3 seconds for the ball to hit the ground

18. The path of a firework after it is lit and released can be modelled by the relation  $y = -0.4x^2 + 3.2x$ , where  $y$  represents the height in metres of the firework above the ground and  $x$  represents the horizontal distance in metres from the release point. The firework explodes when it reaches its maximum at a horizontal distance of 4 m. What is the height of the firework when it explodes?

$$y = -0.4x^2 + 3.2x$$

$$\text{sub in } x = 4$$

$$y = -0.4(4)^2 + 3.2(4)$$

$$= 6.4$$

$\therefore$  the height the firework explodes is 6.4 m

19. What is the height of a cone with volume  $47.8 \text{ mm}^3$  and radius 2.5 mm?

$$V = \frac{1}{3}\pi r^2 h$$

$$47.8 = \frac{1}{3}\pi (2.5)^2 h$$

$$143.4 = 6.25\pi h$$

$$\frac{143.4}{6.25\pi} = h$$

$$7.3 \approx h$$

$\therefore$  the height of the cone is 7.3 mm